

INDUSTRIAL DESIGN AND HUMAN FACTORS (IDHF)

CTC is a non-traditional defense contractor interested in teaming with the FCS LSI to provide our decades of experience in Human Factors, MANPRINT and Industrial Design, Numerical Analysis, System and Component Testing and Materials Engineering for a variety of systems. CTC is an independent entity of United Defense Industries. Approximately 50% of our revenue is comes from commercial industry clients, representing diverse industries. The following details our Industrial Design and Human Factors (IDHF) capability. Additional CTC capabilities are detailed at our website www.ctc-consultants.com.

The IDHF Group is a fully qualified, broadly experienced and "in-the-trenches" proven MANPRINT team, and desires to become a member of FCS LSI Team. The six-member IDHF core represents nearly 200 years of dedicated, all-domain, MANPRINT experience (10 years in a comprehensive, cohesive, synergistic team setting) primarily specializing in US Army and Marine Corps ground systems. Our focus has been and continues to be design optimization of the man/machine interfaces of military systems, subsystems and componentry, resulting in minimum crew sizes, reduced task complexity, improved performance levels, and realistic operator/maintainer cognitive and physical demands. Embedded in these traditional MANPRINT analyses techniques, talents and capabilities are four major value-added, systems-integration-enhancing indicators that exemplify the benefit of IDHF as a teammate:

- Crew task overloading and robot/human task sharing are two system integration/design characteristics of paramount interest and concern in the operationally revolutionary FCS. One of the primary tools that the IDHF Group uses to evaluate and minimize/optimize these situations is IMPRINT, an integrated software tool that provides an exceptional analysis platform for this effort. It comprises two methods for evaluating workload – the Visual, Auditory, Cognitive, and Psychomotor (VACP) method and the Advanced Workload method. In general, VACP is less complex and would be used as a first cut workload analysis tool used early in the design process (e.g., CTD), and as the design becomes more mature (e.g., prior to SSD), the model would be transitioned into the Advanced Workload method. This Advanced Workload segment is based on WinCrew, a Microsoft Windows version of CrewCut, which was developed in 1992. Of interest is the fact that the analytic effort, Crew Reduction in Armored Vehicles Ergonomic Study (CRAVES), that led to the development of CrewCut included a member of the current IDHF staff, and subsequently, IDHF was invited to support the "beta-type" utilization of WinCrew and IMPRINT.
- Physical dimensions of each individual Future Combat System will be one of many design challenges – to IDHF this challenge pertains more specifically to crewstations and troop compartments. We pride ourselves in our extensive experience in integrating HFE into virtual mockups and prototypes. In 1990, IDHF was the first to use the JACK model and its three-dimensional man-model program for HFE analysis for combat vehicle development. Since then, we have developed and applied JACK to nearly every ground weapon system in the US inventory. We were a sponsor and supported the development of JACK, which has allowed us to provide feedback into program upgrades and puts us in the leading role for using JACK to support the design wherever anthropometric analysis is required for FCS.
- IDHF performed elementary workload analyses related to robot control, monitoring and supervision as a member of the HFE segment of the FCS Full Spectrum Team, and the results piqued our interest enough to fund a related IR&D effort. This effort is currently ongoing and will be continued into the next calendar year.
- Members of IDHF and the Army Research Laboratory (ARL) Human Research & Engineering Directorate (HRED) have had long-standing personal and working relationships stretching over two decades. Through the years, these relationships have resulted in the cross-transfer of state-of-the-art, man-machine interface information, concepts and related analytical approaches; and led to a deep understanding of current Army requirements. Staff members have experience in automation that date back to AGVT, RCC, as well as the VCDD and other crew station automation efforts.

Systems Benefiting from Significant IDHF Staff Participation and Influence	CTC MANPRINT DOMAIN						
	Human Factors	System Safety	Health Hazard	Soldier Survivability	Manpower	Personnel	Training
Future Scout Cavalry System	X	X	X		X	X	
Bradley Fighting Vehicle M2/M3	X	X	X	X	X	X	X
M1A1/A2	X						
AGVT/RCC	X						
AGS	X	X	X	X	X	X	X
Crusader	X						
C2V	X						
Grizzly	X						
BFIST	X	X	X	X	X	X	X
FCS	X	X	X		X	X	
AAV	X	X					
Applique	X	X	X	X			
CAV	X						
Breacher	X						

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